Answer Key

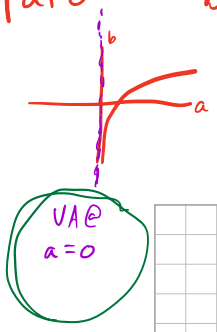
Name: _____

p1017: Graphing transformed parents and locating features

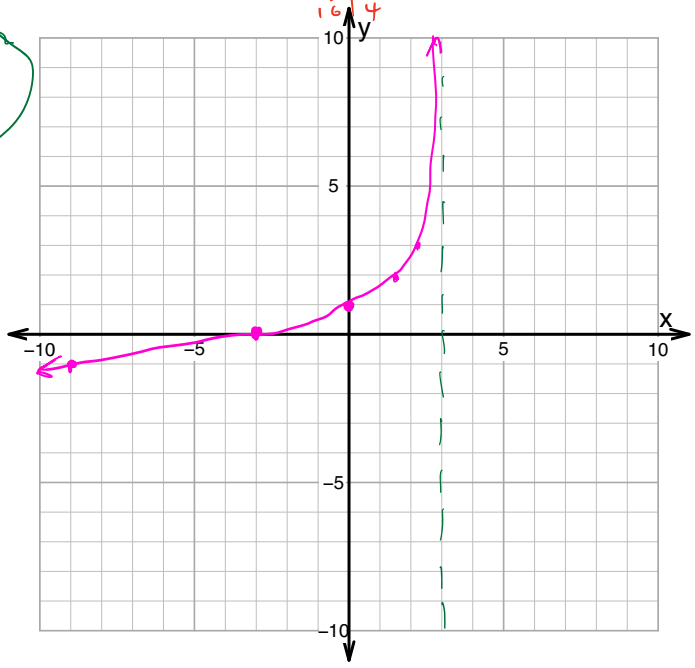
1. Make an accurate graph, and describe locations of features.

$$y = -\log_2\left(1 - \frac{x}{3}\right) + 1$$

Parent: $b = \log_2(a)$



a	b
1/4	-2
1/2	-1
1	0
2	1
4	2
8	3
16	4



Feature	Where
Domain	$(-\infty, 3)$
Range	$(-\infty, \infty)$
Positive	$(-3, 3)$
Negative	$(-\infty, -3)$
Increasing	$(-\infty, 3)$
Decreasing	$\emptyset$
Asymptote(s)	$x = 3$

$1 - \frac{x}{3} = a$ → $y = -\log_2(a) + 1$

sub 1. $-\frac{x}{3} = a - 1$ → $y = -b + 1$

$y = 1 - b$

Mul by (-1) $\frac{x}{3} = -(a-1)$

distribute $\frac{x}{3} = -a + 1$

Mul by 3 $x = 3 \cdot (-a+1)$

Distribute $x = -3a + 3$

$x = 3 - 3a$

a	b	$x = 3 - 3a$	$y = 1 - b$
1/4	-2	$3 - 3/4 = 2.25$	3
1/2	-1	$3 - 3/2 = 1.5$	2
1	0	$3 - 3 \cdot 1 = 0$	1
2	1	$3 - 3 \cdot 2 = -3$	0
4	2	$3 - 3 \cdot 4 = -9$	-1
8	3	$3 - 3 \cdot 8 = -21$	-2
16	4	$3 - 3 \cdot 16 = -45$	-3

parent VA @ $a = 0$

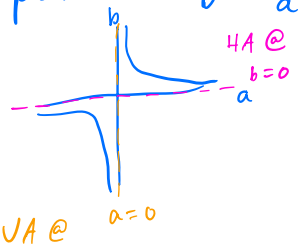
$x = 3 - 3 \cdot 0$

$x = 3$

child VA @ $x = 3$

2. Make an accurate graph, and describe locations of the features.

parent: $b = \frac{1}{a}$



a	b
-2	-1/2
-1	-1
-1/2	-2
1/2	2
1	1
2	1/2

$$y = \frac{3}{x+5} - 1$$

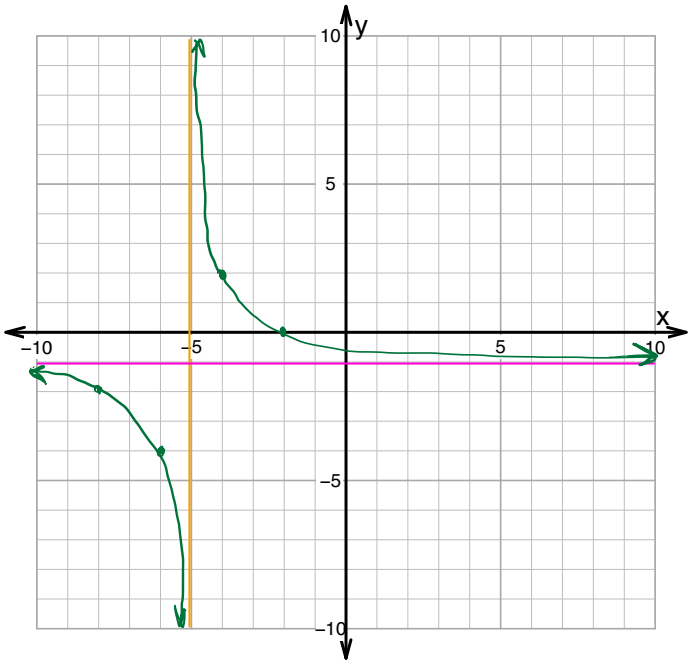
$x + 5 = a$

$x = a - 5$

$y = \frac{3}{a} - 1$

$y = 3 \cdot \frac{1}{a} - 1$

$y = 3 \cdot b - 1$



a	b	x	y
-1	-1	-6	-4
1	1	-4	2

parent VA @ $a = 0$

child: $x = 0 - 5$

VA @ $x = -5$

parent HA @ $b = 0$

child $y = 3 \cdot 0 - 1$

HA @ $y = -1$

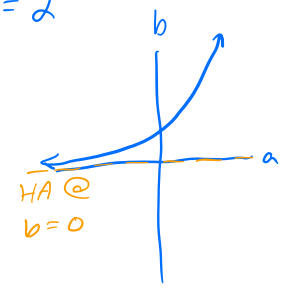
Feature	Where
Domain	$(-\infty, -5) \cup (-5, \infty)$
Range	$(-\infty, -1) \cup (-1, \infty)$
Positive	$(-5, -2)$
Negative	$(-\infty, -5) \cup (-2, \infty)$
Increasing	$\emptyset$
Decreasing	$(-\infty, -5) \cup (-5, \infty)$
Asymptote(s)	$y = -1$ and $x = -5$

3. Make an accurate graph, and describe locations of the features.

$$y = 2^{1-\frac{x}{3}} - 4$$

parent $b = 2^a$

a	b
-2	1/4
-1	1/2
0	1
1	2
2	4
3	8
4	16



$1 - \frac{x}{3} = a$

$1 = a + \frac{x}{3}$

$1 - a = \frac{x}{3}$

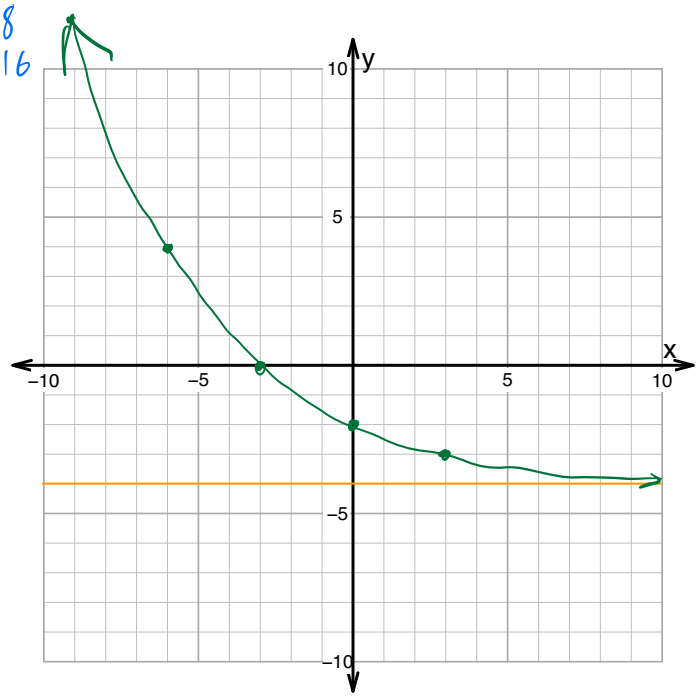
$3(1-a) = x$

$3 - 3a = x$

$x = 3 - 3a$

$y = 2^a - 4$

$y = b - 4$



a	b	x	y
0	1	3	-3
1	2	0	-2
2	4	-3	0
3	8	-6	4
4	16	-9	12

Feature	Where
Domain	$(-\infty, \infty)$
Range	$(-4, \infty)$
Positive	$(-\infty, -3)$
Negative	$(-3, \infty)$
Increasing	$\emptyset$
Decreasing	$(-\infty, \infty)$
Asymptote(s)	$y = -4$

parent HA @ $b = 0$

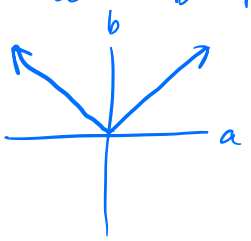
$y = 0 - 4$

child HA @ $y = -4$

4. Make an accurate graph, and describe locations of the features.

$$y = -\left|\frac{x}{3} - 1\right| + 2$$

parent: $b = |a|$



a	b
−3	3
−2	2
−1	1
0	0
1	1
2	2
3	3

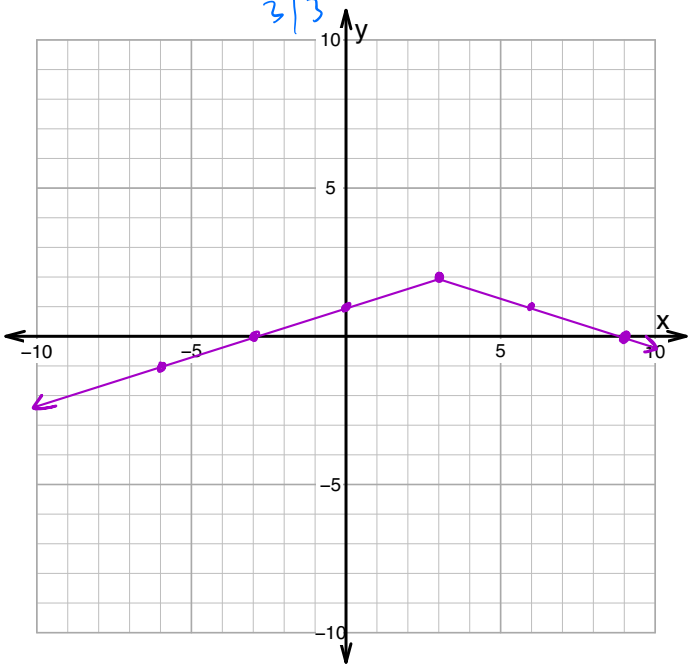
$\frac{x}{3} - 1 = a$

$\frac{x}{3} = a + 1$

$x = 3a + 3$

$y = -|a| + 2$

$y = -b + 2$



a	b	x	y
−3	3	−6	−1
−2	2	−3	0
−1	1	0	1
0	0	3	2
1	1	6	1
2	2	9	0
3	3	12	−1

Feature	Where
Domain	$(-\infty, \infty)$
Range	$(-\infty, 2]$
Positive	$(-3, 9)$
Negative	$(-\infty, -3) \cup (9, \infty)$
Increasing	$(-\infty, 3)$
Decreasing	$(3, \infty)$
Asymptote(s)	$\emptyset$